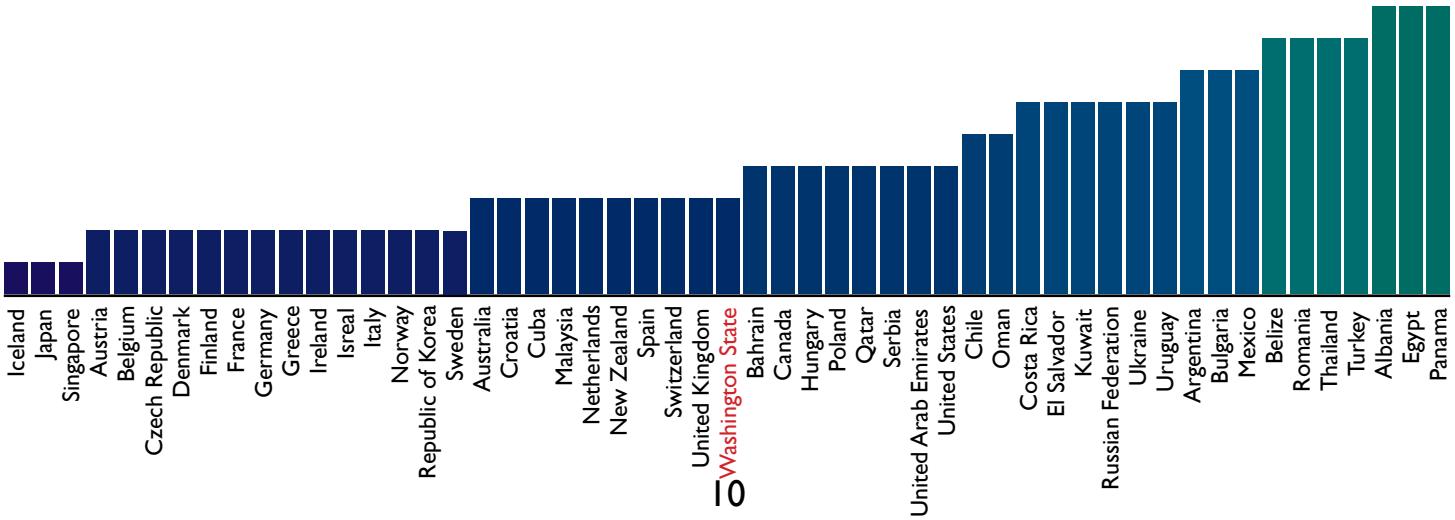
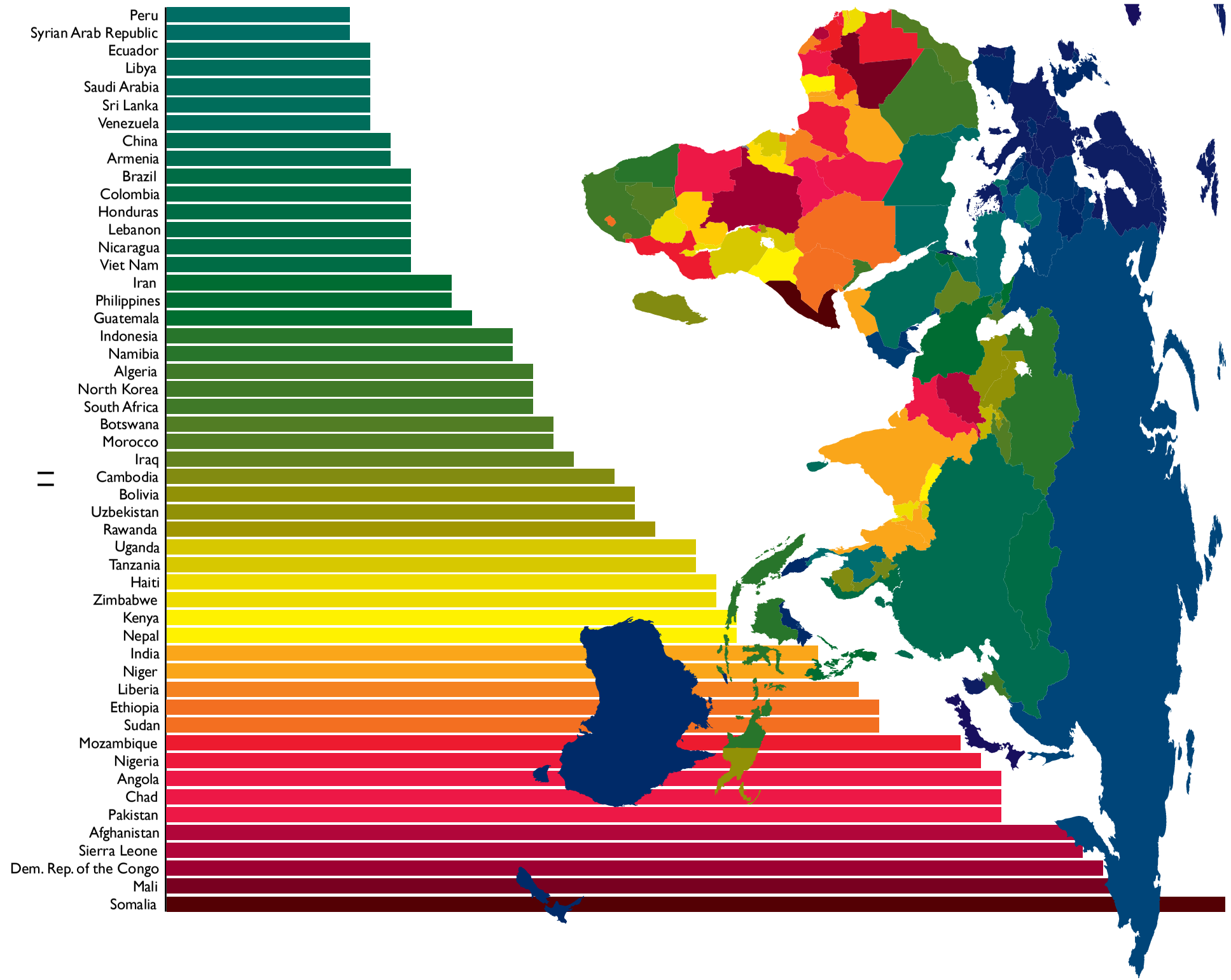
Section 1. Introduction

Global neonatal mortality rates per 1,000 live births

(WHO, 2012; Cawthon, 2012)

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Guatemala
Indonesia
Namibia
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North Korea
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Cambodia
Bolivia
Uzbekistan
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Mali
Somalia

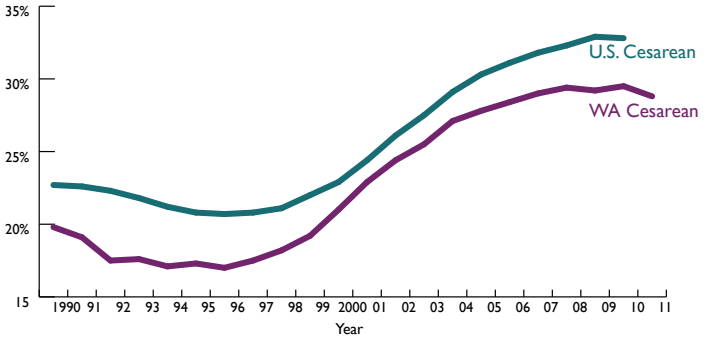
1. Introduction
Epidemiology of Cesarean Birth

Since 2005 Cesarean births have accounted for at least 30% of all U.S. births (Menacker & Hamilton, 2010)

The Agency for Healthcare Research and Quality (AHRQ) reported that Cesarean deliveries increased more than 50% between 1997 and 2006, and had become the most commonly performed operating room procedure in the U.S. (Russo, Wier & Steiner, 2009). While there is large variation both geographically and among different types of providers, the potential for adverse maternal and neonatal health outcomes and high costs associated with Cesarean delivery have been growing public health concerns (Moczygemba et al., 2010; De Luca et al., 2009; Kuklina et al., 2009; Russo et al., 2009; Liu et al., 2007). Despite increased risks of infection, hemorrhage, bladder injury, and downstream sequelae (Clark, Belfort, Byrum, Meyers & Perlin, 2008), until recently, Cesarean birth rates had been steadily increasing in the U.S. In 2010 the Centers for Disease Control and Prevention (CDC) reported a slight decline in the Cesarean delivery rate from 32.9% in 2009 to 32.8% (Martin, 2012). Whether this dip represents a trend is yet to be seen, and the figure remains well above the Healthy People 2020 goal of 23.9% for Cesarean delivery among low-risk women with term singleton fetuses in vertex presentation with no prior Cesarean births (DHHS, 2012).

Cesarean delivery rates in Washington State have been consistently lower than in the U.S. as a whole (Menacker & Hamilton, 2010). However, both rates began increasing in 1996, and increases were largely consistent across subgroups by age, race, and ethnicity (Menacker & Hamilton, 2010). In 34 states, Cesarean delivery rates increased 50% or more between 1996 and 2009. Washington's Cesarean delivery rate increased 73% between 1996 and 2009, the second highest rates of change nationally (Menacker & Hamilton, 2010).

Figure 1.3. *U.S. & Washington Cesarean Delivery Rates (percent of live births), 1990-2011*



Source: DSHS RDA First Steps Database analysis of national birth records from NCHS and Washington State birth records from DOH Center for Health Statistics (CDC, 2012; WA DOH, 2012)

A complex interplay of factors is responsible for increases in Cesarean delivery. Contextual factors including liability concerns, hospital economics, and payment strategies may be less amenable to intervention than are clinical practices (Main et al., 2011; Guise et al., 2010). Identifying measurable modifiable factors and utilizing evidence-based approaches to incite change are critical to reducing Cesarean delivery rates and mitigating the associated risks. The next sections will focus on some of the key modifiable factors contributing to increased Cesarean rates, namely, increased non-medically indicated inductions of labor (eIOL), decreased trial of labor (TOL), and vaginal birth after Cesarean (VBAC).

Elective vs. Medically Indicated Induction of Labor

Much of the increase in Cesarean deliveries over the past two decades has been attributed to rising rates of not medically indicated, or "elective," inductions (eIOL) (Martin & Foley, 2006). Induction rates across the U.S. have increased substantially at all gestational ages, including preterm (less than 37 weeks of gestation) and late preterm (34 through 36 weeks of gestation) (Martin et al., 2009). Between 1990 and 2009 the proportion of U.S. births from induced labor more than doubled (9.5% to 23.1%)

with substantial variation across states (King, Pilliod & Little, 2010; Sakala & Corry, 2008). It is not known what proportion of induced labors are elective. However, the overall rate of induced labor has risen faster than the rate of medically indicated IOL and it is therefore plausible that increasing eIOL rates account for the remainder (King et al., 2010; MacDorman, Mathews, Martin & Malloy, 2002; Zhang, Yancey & Henderson, 2002). A growing body of evidence has demonstrated attainable decreases in eIOL rates without corresponding increases in maternal or neonatal morbidity and mortality (Clark et al., 2010; Oshiro, Henry, Wilson, Branch & Varner, 2009; Reisner, Wallin, Zingheim & Luthy, 2009).

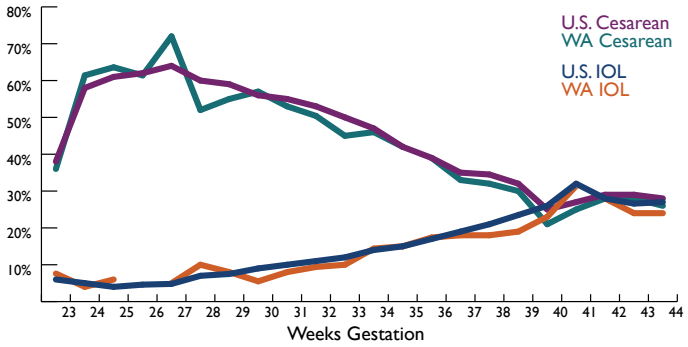
In 1990, the rate of induced labor in Washington State (16.2%) was higher than that for the U.S. as a whole (9.5%). However, the rate in Washington State began to decline in 2007 and was lower than the U.S. national average. Since 2009, Washington State's IOL rate has remained below 21% (Figure 1.4) and total IOL and Cesarean delivery rates trend closely with those of the rest of the nation (Figures 1.4 and 1.5).

Between **1990 & 2009** the proportion of U.S. births from induced labor ***more than doubled***

Figure 1.4. *U.S. & Washington Total Induction Rates (percent of live births with induced labor), 1990-2011*

Source: DSHS RDA First Steps Database analysis of national birth records from NCHS and Washington State birth records from DOH Center for Health Statistics (CDC, 2012; WA DOH, 2012)

Figure 1.5. *U.S. & Washington Induction of Labor & Cesarean Rates by Gestational Age*



Source: DSHS RDA First Steps Database analysis of national birth records from NCHS and Washington State birth records from DOH Center for Health Statistics (CDC, 2012; WA DOH, 2012)

The willingness of providers to induce at earlier gestational ages appears to have shifted for both medically indicated inductions and those without a firm medical indication (Engle & Kominiarek, 2008). Small changes in thresholds for IOL can dramatically increase the number of women who undergo IOL because both the procedure itself and its "soft" indications are common. Therefore, increases in inductions without a compelling medical indication may also be a driver for increased rates of Cesarean delivery (Engle & Kominiarek, 2008; Moore & Rayburn, 2006).

Use of induction, particularly among nulliparous women and those without a favorable (ready for labor) cervix, is associated with increased use of health care resources, longer labors and increased use of Cesarean delivery (Grobman, 2007). Neonatal mortality has been shown to be significantly higher for infants of women induced, whether at term or prior to 37 weeks, even after controlling for both sociodemographic and medical risk factors (MacDorman et al., 2002). In contrast, perinatal mortality after IOL for post-term inductions in this same analysis demonstrated a statistically significant decrease (MacDorman et al., 2002).

Elective or non-medically indicated IOL presents a targetable measure well-suited to intervention and has been demonstrated in numerous studies to safely reduce the unnecessary Cesarean delivery rate. Additionally, maternity care change leaders throughout the U.S., in a variety of care settings, have documented sustainable improvements in Cesarean delivery rates employing targeted interventions through continuous quality improvement strategies (Clark et al., 2010; Reisner et al., 2009; Oshiro et al., 2009).

Primary Cesarean

There is some agreement that the increasing primary Cesarean rate and decreasing vaginal birth after Cesarean (VBAC) rate are key drivers in the rise of the overall Cesarean delivery rate.

The Healthy People 2020 goal is a **23.9% Cesarean delivery rate** for low-risk women with term, singleton fetuses in vertex presentation with no prior Cesarean births (U.S. DHHS, 2012)

Main and colleagues (2011) noted that the greatest contributor among all Cesarean indications is a prior Cesarean delivery, and over 90% of women with a previous Cesarean are likely to have a repeat Cesarean (Main et al., 2011). Another study of documented indications for primary and repeat Cesareans found that 50% of the Cesarean rate increase was attributable to increasing primary Cesarean deliveries (Barber et al., 2011). Decreasing the primary Cesarean rate would have the largest impact on the overall Cesarean delivery rate.

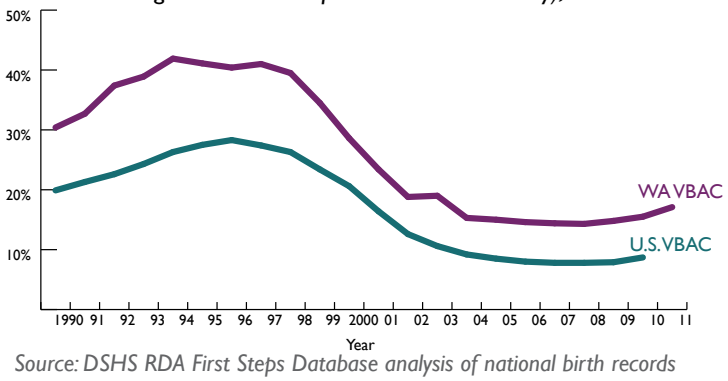
Vaginal Birth After Cesarean

In the mid-1990s, the American Congress of Obstetricians and Gynecologists (ACOG) recommendation for trial of labor after previous Cesarean birth added requirements for hospital resources to respond to acute intrapartum obstetric emergencies and increase the availability of personnel capable of performing Cesarean delivery (ACOG, 1995). Concerns over liability and logistics of providing "immediately available" resources, including anesthesia services, for emergency Cesareans reduced the number of hospitals offering planned VBAC services and limited women's access, particularly in smaller or more remote hospitals (Roberts, Deutchman, King, Fryer & Miyoshi, 2007). Updated VBAC recommendations issued by ACOG in 2010 specified that rural hospitals could offer trial of labor after Cesarean (TOLAC) without surgical staff immediately present if patients were adequately informed and willing to accept an increased level of risk (Leeman & King, 2011; ACOG, 2010).

The Healthy People 2020 goal is an **18.3% VBAC rate** for low-risk women with term, singleton fetuses in vertex presentation with a prior Cesarean birth (U.S. DHHS, 2012)

Washington State's VBAC rates parallel national rates, but have been higher than the national average (see Figure 1.6). After peaking at 41.9% in 1994, VBAC rates in Washington State declined until 2009, and have demonstrated a slight increase since that time. National rates have remained at approximately half of Washington State's.

Figure 1.6. *U.S. & Washington VBAC Rates (percent of vaginal deliveries among women with a prior Cesarean delivery), 1990-2011*



Source: DSHS RDA First Steps Database analysis of national birth records from NCHS and Washington State birth records from DOH Center for Health Statistics (CDC, 2012; WA DOH, 2012)

Subjective vs. Objective Indications

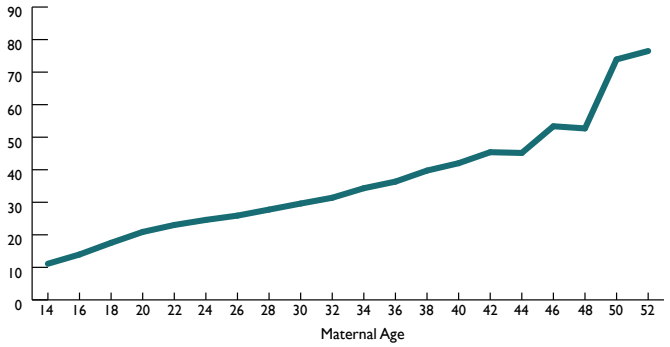
Barber and colleagues (2011) examined documented indications for primary and repeat Cesarean deliveries in their 2011 study, and found that 50% of the Cesarean delivery rate increase was attributable to an increase in primary Cesarean deliveries. The authors examined indications for Cesarean delivery, and found that the most common were non-reassuring fetal heart status (32%) and labor arrest (18%). The study concluded that more subjective

indications (non-reassuring fetal heart status, arrest of dilation) contributed to a greater proportion of Cesarean deliveries than did more objective indications, such as malpresentation.

Changing Demographics

Changing maternal demographics such as increased age and obesity (commonly measured by the Body Mass Index, or BMI) affect Cesarean delivery rates. There is a strong association between high pre-pregnancy BMI and unfavorable pregnancy outcomes. One study noted that obese women were more likely to experience Cesarean deliveries than their normal weight counterparts. Women with a BMI between 30 and 40 (meeting the definition of obesity) were twice as likely, and women with BMI greater than 40 were three times as likely to experience a Cesarean birth (Chung et al., 2012). Increasing age is also recognized as a risk factor for Cesarean (Figure 1.7), but the reasons behind this are not fully understood (Bayrampour & Heaman, 2010).

Figure 1.7. *Cesarean Delivery Rates in Relation to Maternal Age*



Source: DSHS RDA First Steps Database analysis of national birth records from NCHS and Washington State birth records from DOH Center for Health Statistics (WA DOH, 2012)

Maternal Preference

There is not widespread agreement about the role of maternal preference in driving current rates of Cesarean delivery. Researchers have suggested that women's perceptions of the safety of elective IOL may not be accurate and may contribute to increased patient demand for the procedure (Goldenberg, McClure, Bhattacharya, Groat & Stahl, 2009). Wax, Cartin, Pinette, and Blackstone (2004) noted that primary elective Cesarean delivery comprised between 4-18% of all Cesarean deliveries and between 14-22% of elective Cesareans, largely due to patient fear of childbirth. Childbirth Connection's "Listening to Mothers" Survey found little evidence that women were requesting elective Cesareans in large numbers and cited that one quarter of women undergoing Cesarean delivery reported being pressured by a health professional to do so (Declercq, Sakala, Corry & Applebaum, 2006). However, Barber and colleagues (2011) reported that while maternal request did not contribute a large percentage of the increase in the overall Cesarean rate, it was the most rapidly increasing contributor to indications for Cesarean delivery.

Medico-Legal Environment & Payment Incentives

Murthy, Grobman, Lee and Holl (2009) have reported that rising provider insurance premiums were correlated with increases in inductions for late preterm women, and that for every additional $10,000 paid in malpractice insurance inductions increased significantly.

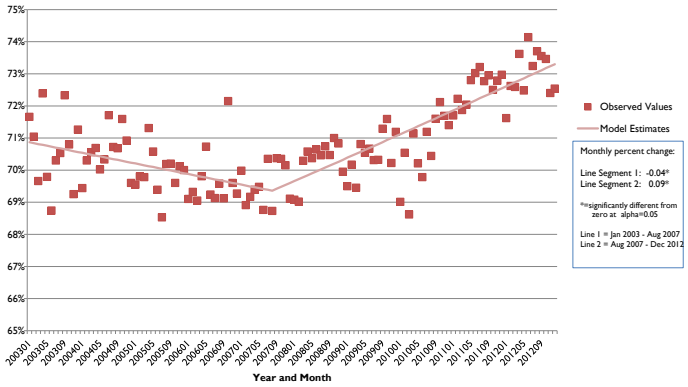
Payment models may also contribute to rising Cesarean delivery rates. Healthcare providers are motivated to deliver their own patients, as global fee reimbursement for maternity care is based on attendance at delivery. Providers are financially incentivized to deliver on their shift in order to be compensated for their time-intensive investment. As providers are paid based on the actual delivery, they may be less likely to tolerate longer labors and may move a patient towards Cesarean or toward interventions that carry a higher risk of Cesarean birth (Main et al., 2011).

Efforts in Washington State

Washington State's 2011 efforts to eliminate non-medically indicated deliveries from 37 to less than 39 weeks gestation relied on data, a community dialogue to better understand variation and trends, and financial incentives to hospitals. Encouraging reductions in early term deliveries is emerging as a priority throughout Washington State and the U.S., with initiatives like CMS' *Strong Start* and March of Dimes' *Healthy Babies Are Worth the Wait®*. As shown in Figure 1.8. the increase in the proportion

of births at 39-41 weeks gestational age among all term births reached a low point in Washington State in mid-2009, prior to the start of organized statewide improvement efforts. Since 2009, the proportion of late term births has steadily increased, with corresponding reduction in the proportion of early term births. The statistically significant upward trend continues after the commencement of the Washington State Medicaid Quality Incentive initiative, which was part of the 2010 Safety Net Assessment legislation (RCW 74.60).

Figure 1.8. *39+ Weeks Gestation as a Portion of All Births 37-41 Weeks in Washington (non-military hospitals), 2003-2012*

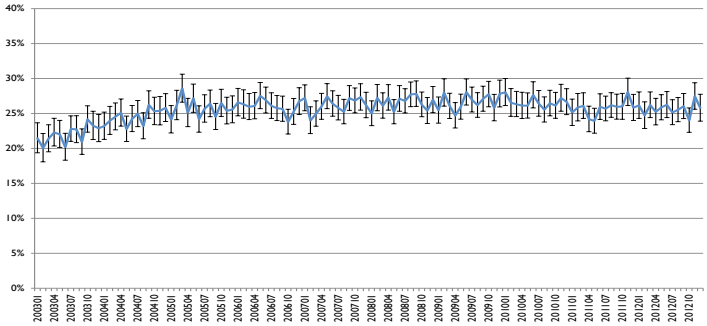


Birth Certificate Data for 2012 are preliminary. Limited to live births 37 through 41 weeks gestation. '39+ Weeks Gestation' means at least 39 completed weeks gestation. Model statistics were determined using the Joinpoint Regression Program, Version 3.5.4. August 2012; Statistical Research and Applications Branch, National Cancer Institute.

Source: DSHS RDA First Steps Database analysis of national birth records from NCHS and Washington State birth records from DOH Center for Health Statistics (WA DOH, 2012)

Figure 1.9 illustrates that the Cesarean birth rate remains relatively unchanged, based on birth certificate data. Washington State has conducted a pilot validation study of nulliparous, term, singleton, vertex (NTSV) rates from birth certificate data compared to hospital administrative data, or medical records, at five Washington hospitals. This study showed that NTSV Cesarean delivery rates based on birth certificate data are comparable to those based on medical records/administrative data, and that neither in aggregate, nor for any individual hospital, did the differences between birth certificate and chart abstraction/administrative data approach statistical significance (Cawthon, 2011). Figures 1.8 and 1.9 illustrate positive changes which appear to be maintained thus far. It remains to be seen how much further improvement can be achieved in shifting early term deliveries to late term deliveries and to what extent focused interventions to reduce Cesarean deliveries planned to begin in 2014 will reduce the NTSV Cesarean delivery rate. This toolkit is a first step in supporting targeted improvement initiatives in this area.

Figure 1.9. *Washington State NTSV Cesarean Birth Rates (non-military hospitals), 2003-2012*



Birth Certificate Data for 2012 are preliminary. NTSV data exclude records with unknown characteristics of labor and delivery and cases where mother was transferred to higher level care for maternal medical or fetal indicators for delivery, or where intended place of birth was other than hospital.

Source: DSHS RDA First Steps Database analysis of national birth records from NCHS and Washington State birth records from DOH Center for Health Statistics (WA DOH, 2012)

Moving Forward

Many factors contribute to the current use of Cesarean delivery, some of which are more amenable to change than others. In the ***Evidence-based Strategies*** section, antepartum and intrapartum interventions are examined in detail to help determine where efforts may most prudently be directed in your community of institution to reduce Cesarean deliveries.

Nationally, multiple institutions of varying size and organizational structure have demonstrated that Cesarean delivery rates can safely and successfully be lowered by reducing non-medically indicated IOL. Washington State has already shown progress in reducing elective inductions between 37 and less than 39 weeks gestation. The following sections address this and other evidence-based strategies for reducing Cesarean deliveries, and introduce innovative models nationwide that have sustained change, primarily through reduction of non-medically indicated early delivery. The methods utilized by the highlighted institutions to achieve change are applicable to other change initiatives to reduce Cesarean delivery.

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